31 $f(x) = |x+3| + |x-2|$ $[-5, 5]$

$f'(x) = \text{sign}(x+3) + \text{sign}(x-2)$

$\text{sign}(x) = \begin{cases} 1 & \text{if } x>0 \\ -1 & \text{if } x<0 \end{cases}$

$f' = 0$ $-3<x<2$ $y=5$

$f' = \nexists$ $x=-3$ $y=5$ abs min

$x=2$ $y=5$ $y=5$

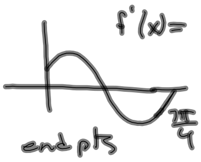
$x=-5$ $y=9$ local max

$x=5$ $y=11$ abs max

Oct 13-10:05 AM

15 $f(x) = \sin(x+\frac{\pi}{4})$ $0 \le x \le \frac{7\pi}{4}$

$f'(x) = \cos(x+\frac{\pi}{4}) = 0$



$\cos(\frac{\pi}{2}) = 0$ $\cos(\frac{3\pi}{2}) = 0$

end pts

$x=0$ $x=\frac{7\pi}{4}$ $x+\frac{\pi}{4} = \frac{\pi}{2}$ $x+\frac{\pi}{4} = \frac{3\pi}{2}$

$y=\frac{\sqrt{2}}{2}$ $y=0$ $x=\frac{\pi}{4}$ $x=\frac{5\pi}{4}$

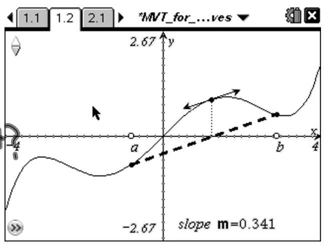
local ~~max~~ min, local ~~min~~ max, $y=1$ abs max, $y=-1$ abs min

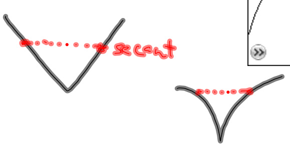
Oct 13-10:16 AM

4.2 Mean Value Theorem for Derivatives

MVT

Could there be a graph with no tan lines that are || secant?

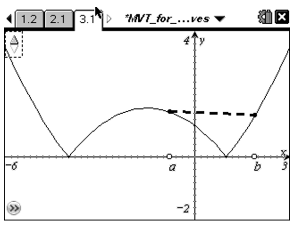




Oct 18-1:10 PM

Find the point that satisfies the mean value theorem

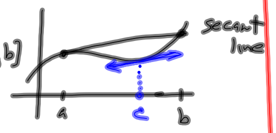
none



Oct 18-1:13 PM

MVT p 196

If $f(x)$ continuous on $[a,b]$ and differentiable on (a,b)



then there is at point c so that

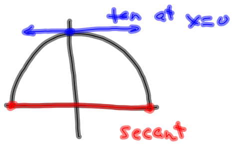
$$f'(c) = \frac{f(b)-f(a)}{b-a}$$

Oct 13-10:40 AM

1.1 *Unsaved

Find the value that satisfies the mean value theorem for $f(x)=\sqrt{1-x^2}$ on $[\overset{a}{-1},\overset{b}{1}]$

$$f'(x) = (-2x)\,\tfrac{1}{2}(1-x^2)^{-\frac{1}{2}} = \frac{\sqrt{1-1^2}-\sqrt{1-(-1)^2}}{1--1}$$



$$\frac{-x}{\sqrt{1-x^2}} = 0$$

$x=0$

so $c=0$

Oct 18-1:17 PM

physical interpretation of the mvt -
instantaneous velocity vs average velocity

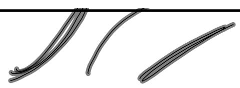
$$f'(c) = \frac{f(b)-f(a)}{b-a}$$

a car accelerates from zero and takes 8 seconds to cover 352 feet. The average velocity = 352/8 ft/sec = 44 ft/sec = 30 mph. What can we conclude?

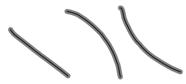
$$\frac{352-0}{8-0} = 44\ \frac{ft}{sec}$$

Oct 18-1:20 PM

prove: If f ' > 0 then f increases



$f' < 0$, f decreases



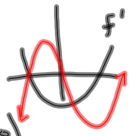
Oct 18-1:31 PM

Where is f(x)=x^3 - 4x increasing and where is it decreasing?

$f = x^3 - 4x$

$f' = 3x^2 - 4 = 0$

$x = \pm\sqrt{\frac{4}{3}}$



$f' > 0$ $\left(-\infty, -\sqrt{\frac{4}{3}}\right) \cup \left(\sqrt{\frac{4}{3}}, \infty\right)$

f increases on

$f' < 0$ $\left(-\sqrt{\frac{4}{3}}, \sqrt{\frac{4}{3}}\right)$

f dec

Oct 18-1:32 PM